

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

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Applicant : Lev Uryevich ROBERTS-HARITONOV et al.
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Mail Stop Amendment
Commissioner for Patents
P.O. Box 1450
Alexandria VA 22313-1450
Attention: Examiner Vishal A. PATEL

RESPONSE WITH AMENDMENT UNDER 37 C.F.R. §1.111

Sir:

The following amendment is being submitted in response to the Office Action dated March 22, 2006, the due date for response to which has been extended to July 24, 2006 (the next business day after July 22, 2006) by the Petition For Extension Of Time that is filed herewith. Please enter and consider the following amendment and remarks as follows:

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ANNOTATED SHEET SHOWING CHANGES	ATTACHED
REPLACEMENT SHEET	ATTACHED

I hereby certify that this correspondence is being transmitted to the

United States Patent and Trademark Office, on

By: Applicant, Assignee, or Representative

Signature:

07-24-2006
MARIAH MOORHEAD
Mariah Moorhead

IN THE DRAWINGS

The Examiner's permission is requested to make the changes to FIG. 2 shown as annotated in the enclosed sketch. The change is to put a reference number on the fastener 75 to correspond to the newly amended specification which refers to the two fasteners for each of the sub-assemblies. No new matter has been added. As required under 37 CFR 1.84 an "Annotated Sheet Showing Changes" and a "Replacement Sheet" for FIG. 2 is attached hereto.

AMENDMENTS TO THE SPECIFICATION

Please replace paragraph [0019] with the following amended paragraph:

[0019] In the present invention, the inboard 10 and outboard 12 stages of a tandem seal are constructed as totally separate modules, each containing ~~[[the]]~~ components ~~[[of]]~~ corresponding to one of the sealing stages of the known tandem seal shown in Figure 1. In order to avoid unnecessary repetition, like components have been allocated like reference numerals as previously described in Figure 1, and will not be described a second time. Components ~~which~~ that serve the same function, but have been modified, have also been allocated the same reference numerals, but a prime has been added to show that the component has been changed.

Please replace paragraph [0023] with the following amended paragraph:

[0023] In the prior art tandem seal of Figure 1, spacer sleeve 50 is used to hold the mating ring 16 to the annular flange 44 of the inboard stage 10. On the other hand, in the tandem gas seal assembly of the present invention shown in Figure 2, no spacer sleeve is used to hold the mating ring 16 to the annular flange 44' of the support sleeve 40' of the inboard stage 10. In the tandem gas seal assembly of the present invention, the mating ring 16 of the inboard stage 10 is held to the annular flange 44' of the inboard stage 10 by a locking sleeve 60' at the inboard stage 10.

Please replace paragraph [0024] with the following amended paragraph:

[0024] The above modifications result in a total separation of the two sealing stages and each can now function totally independently of the other. In other words, they do not

need to be placed next to one another for them both to function normally. It is preferred to mount them next to each other and each sealing stage is fastened to its respective rotating support sleeve 40' with a separate fastener 75 oriented in substantially one direction, as illustrated. ~~because they~~Further each sealing stage can then be retained using a single locknut 42 on the rotor 30, as previously described.

No new matter has been added and this amendment to the paragraph describes the structure of FIG. 2 as originally filed.

CLAIMS

1. (Currently Amended) A tandem gas seal assembly for forming a seal between a rotor and a casing of a rotary machine, the tandem gas seal comprising:

two sealing stages for mounting axially adjacent to one another in the rotary machine, each of the sealing stages comprising a rotating sub-assembly for mounting on the rotor and a stationary sub-assembly for mounting in the casing,

wherein:

each rotating sub-assembly includes a support sleeve mounted on the rotor, a rotating mating ring with a front face,[[and]] a locking sleeve slideably mounted on top of the support sleeve and a fastener releasably securing the locking sleeve and the support sleeve to one another, a first end of the locking sleeve bearing against the front face of the mating ring thereby retaining the mating ring in the rotating sub-assembly;

each rotating sub-assembly of the two sealing stages including the support sleeve is totally separable from one another and each stationary sub-assembly of the two sealing stages is totally separable from one another,

each of the two stages is capable of functioning as a seal when separated from the other, and

mating formations formed at adjacent axial ends of the rotating sub-assembly of the two sealing stages to maintain the two sealing stages in axial alignment with one another.

2. (Previously Canceled)

3. (Previously Presented) The tandem gas seal assembly of claim 1, wherein the mating formations include an annular collar projecting axially from an axial end of the rotating sub-assembly of a first of the two sealing stages and the annual collar fitting over a cylindrical end region of rotating sub-assembly of the second of the two sealing stages.

4. (Previously Presented) The tandem gas seal assembly of claim 3, further comprising means for effecting a gas tight seal between the mating formations of each rotating assembly of the two sealing stages.
5. (Original) The tandem gas seal assembly of claim 1, wherein each of the two sealing stages is dynamically balanced separately from the other of the two sealing stages.
6. (Original) The tandem gas seal assembly of claim 1, wherein the two sealing stages directly abut one another and are retained on the rotor by means of a lock nut applying an axial force to only an outer of the two sealing stages.
7. (Currently Amended) A rotary machine comprising:
- a rotor;
 - a casing; and
 - a tandem gas seal for forming a seal between the rotor and the casing of the rotary machine, the tandem gas seal including two sealing stages mounted axially adjacent to one another in the rotary machine, each stage comprising a rotating sub-assembly mounted on the rotor and a stationary sub-assembly mounted in the casing, wherein
 - each rotating sub-assembly includes a support sleeve mounted on the rotor, a rotating mating ring with a front face,[[and]] a locking sleeve slideably mounted on top of the support sleeve and a fastener releasably securing the locking sleeve and the support sleeve to one another, a first end of the locking sleeve bearing against the front face of the mating ring thereby retaining the mating ring in the rotating sub-assembly;
 - each of the rotating sub-assembly of the two sealing stages including the support sleeve is totally separable from one another and each of stationary sub-assembly of the two sealing stages is totally separable from one another,
 - each of the two sealing stages is capable of functioning as a seal when separated from the other stage, and

mating formations formed at adjacent axial ends of each rotating sub-assembly of the two sealing stages to maintain the two sealing stages in axial alignment with one another.

8. (Previously Canceled)

9. (Previously Presented) The rotary machine of claim 7, wherein the mating formations include an annular collar projecting axially from an axial end of the rotating sub-assembly of a first of the two sealing stages and the annular collar fitting over a cylindrical end region of the rotating sub-assembly of the second of the two sealing stages.

10. (Previously Presented) The rotary machine of claim 9, wherein the tandem gas seal further comprises means for effecting a gas tight seal between the mating formations of each rotating assembly of the two sealing stages.

11. (Original) The rotary machine of claim 7, wherein each of the two sealing stages is dynamically balanced separately from the other of the two sealing stages.

12. (Original) The rotary machine of claim 7, wherein the two sealing stages directly abut one another and are retained on the rotor by means of a lock nut applying an axial force to only an outer of the two sealing stages.

13. (Currently Amended) A tandem gas seal assembly for forming a seal between a rotor and a casing of a rotary machine, the tandem gas seal comprising:

a first sealing stage and a second sealing stage, where each of the first sealing stage and the second sealing stage are adapted for mounting axially adjacent to one another on a machine rotor, each of the first sealing stage and the second sealing stage includes a rotating sub-assembly for mounting on the rotor and a stationary sub-assembly for mounting in the casing wherein

each rotating sub-assembly includes a support sleeve mounted on the rotor, a rotating mating ring with a front face, ~~[[and]]~~a locking sleeve slideably mounted on top of the support sleeve a fastener releasably securing the locking sleeve and the support sleeve to one another, and a first end of the locking sleeve bearing against the front face of the mating ring thereby retaining the mating ring in the rotating sub-assembly;

each rotating sub-assembly of the first sealing stage and the second sealing stage including the support sleeve is totally separable from one another and each stationary sub-assembly of the two stages is totally separable from one another,

each of the first sealing stage and the second sealing stage is capable of functioning as a seal when separated from the other stage, and

mating formations formed at adjacent axial ends of the rotating sub-assembly of the first sealing stage and the rotating sub-assembly of the second sealing stage to maintain the first sealing stage in axial alignment with the second sealing stage.

14. (Previously Canceled)

15. (Currently Amended) The tandem gas seal assembly of claim 13, wherein the mating formations include an annular collar projecting axially from an axial end of the rotating sub-assembly of ~~[[a]]~~ the first sealing stage and the annual collar fitting over a cylindrical end region of the rotating sub-assembly of the second sealing stage.

16. (Previously Presented) The tandem gas seal assembly of claim 15, further comprising means for effecting a gas tight seal between the mating formations of each rotating sub-assembly of the first sealing stage and the second sealing stage.

17. (Previously Presented) The tandem gas seal assembly of claim 13, wherein the first sealing stage is dynamically balanced separately from the second sealing stage.

18. (Previously Presented) The tandem gas seal assembly of claim 13, wherein the first sealing stage and the second sealing stage are directly abut one another and are retained on the rotor by means of a lock nut applying an axial force to only an outer of the first sealing stage and the second sealing stage.

REMARKS

The Applicants have studied the Office Action dated March 22, 2006. It is submitted that the application, as amended, is in condition for allowance. Claims 1, 7, 13, and 15 are amended. No claims are canceled. No new claims are added. By virtue of this amendment, claims 1, 3-7, 9-13 and 15-18 are pending. Reconsideration and allowance of the pending claims in view of the above amendments and the following remarks is respectfully requested.

Claim Rejections under 35 U.S.C. §112

Reconsideration of the rejection of claims 15 and 16 under 35 U.S.C. §112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter that the Applicants regard as the invention, is respectfully requested in view of the amendment to the claims. In claim 15, line 3, the phrase “a first sealing stage” has been amended to recite “~~the~~ first sealing stage”. There are two stages, a first sealing stage 10 and a second sealing stage 12. To specifically answer the question asked by the Examiner in the Office Action of March 22, 2006: Yes, the first sealing stage mentioned in claim 15, line 3 is the same first sealing stage mentioned in claim 13, line 3. In view of the above, the Applicants respectfully request that the Examiner withdraw the objection to claims 15 and 16.

Claim Rejections under 35 U.S.C. §102(b)

Reconsideration of the rejection of claims 1, 5-7, 11-13 and 17-18 under 35 U.S.C. §102(b) as being anticipated by Uth (DE 10017669A) is respectfully requested for the following reasons.

Regarding the tandem gas seal assembly of Uth, the Examiner is correct that the two sealing stages directly abut one another and that they are retained on the rotor by means of a lock nut 38. Disengagement of lock nut 38 does indeed release the outer (left side of FIG. 1 of Uth) of the two sealing stages. However, unlike the present invention,

disengagement of lock nut 38 also releases the components of the inner (right side of FIG. 1 of Uth) of the two sealing stages. Neither of the two sealing stages of Uth are capable of functioning as a seal when separated from the other, i.e., when lock nut 38 is disengaged. Most of the components of the outer sealing stage of Uth will separate from each other when lock nut 38 is disengaged. Similarly, most of the components of the inner sealing stage of Uth will separate from each other when lock nut 38 is disengaged. It is only when, and because, the outer sealing stage of Uth is secured to the rotor (by lock nut 38) that most of the components of the inner seal stay together in proper operational relationship.

In contrast, the tandem gas seal assembly of the present invention comprises two sealing stages: an inboard, or first, stage 10 (left side of FIG. 2), and an outer, or second, stage 12 (right side of FIG. 2). Each stage 10 and 12 is separately mountable to a rotor 30 by separate support sleeves 40'. The outboard stage 12 is removable from the rotor 30 by disengaging locknut 42. All the components of the outboard stage 12 stay together in proper operational relationship, because each rotating sub-assembly includes its own separate fastener (item 75 in FIG. 2) releasably securing the support sleeve and the locking sleeve of each rotating sub-assembly to one another. As a result, each of the stages is capable of functioning when removed from the rotor until it is itself dismantled by releasing its fastener securing its locking sleeve to its support sleeve. It is this feature that allows each of the two stages to be dismantled, serviced, repaired and balanced off the rotor, totally independently of the other stage.

Unlike the tandem gas seal assembly of Uth, the two sealing stages 10 and 12 of the present invention can function totally independently of the other. In other words, the two sealing stages 10 and 12 of the present invention do not need to be placed next to one another to function normally. The two sealing stages are shown mounted next to each other in FIG. 2, solely because they can then be retained using a single locknut 42 on the rotor 30.

The Examiner cites 35 U.S.C. §102(b), and a proper rejection requires that a single reference teach (i.e., identically describe) each and every element of the rejected

claims as being anticipated by Uth.¹ The fourth element of independent claims 1, 7 and 13, which recites “*each of the two stages is capable of functioning as a seal when separated from the other*”, is not taught or disclosed by Uth. Accordingly, the present invention distinguishes over Uth for at least this reason.

For the foregoing reasons, independent claims 1, 7 and 13 distinguish over Uth. Claims 5-6, 11-12 and 17-18 depend from independent claims 1, 7 and 13 respectively. Because dependent claims contain all the limitations of the independent claims, claims 5-6, 11-12 and 17-18 also distinguish over Uth. The Applicants respectfully submit that the Examiner’s rejection under 35 U.S.C. §102(b) has been overcome, and the Examiner’s rejection should be withdrawn.

Allowable Subject Matter

The Examiner indicated that claims 3-4 and 9-10, which were objected to as being dependent upon a rejected base claim, would be allowable if rewritten in independent form including all the limitations of the base claim and any intervening claims. However, in view of the remarks set forth in this amendment, the Applicants believe that the base claims for dependent claims 3-4 and 9-10 are allowable. Therefore, the Applicants respectfully request that the Examiner withdraw the objection to claims 3-4 and 9-10.

The Examiner indicated that claims 15 and 16 would be allowable if rewritten to overcome the rejection(s) under 35 U.S.C. §112, second paragraph, set forth in the Office Action of March 22, 2006, and to include all the limitations of the base claim and any intervening claims. It is believed that the amendment to claim 15 overcomes the Examiner’s objection to claim 15. Furthermore, in view of the remarks set forth in this amendment, the Applicants believe that the base claim for dependent claims 15 and 16 is allowable. Therefore, the Applicants respectfully request that the Examiner withdraw the objection to claims 15 and 16.

¹ See MPEP ¶2131 (Emphasis Added) “A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference.” *Verdegaal Bros. v. Union Oil Co. of California*, 814 F.2d 628, 631, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987). “The identical invention must be shown in as complete detail as is contained in the . . . claim.”

CONCLUSION

In this Response, the Applicants have amended a claim. In light of the Office Action, the Applicants believe this amendment serves a useful clarification purpose, and are desirable for clarification purposes, independent of patentability. Accordingly, the Applicants respectfully submit that the claim amendment does not limit the range of any permissible equivalents.

The Applicants acknowledge the continuing duty of candor and good faith in the disclosure of information known to be material to the examination of this application. In accordance with 37 CFR §1.56, all such information is dutifully made of record. The foreseeable equivalents of any territory surrendered by amendment is limited to the territory taught by the information of record. No other territory afforded by the doctrine of equivalents is knowingly surrendered and everything else is unforeseeable at the time of this amendment by the Applicants and their attorneys.

The Applicants respectfully submit that all the grounds for rejection stated in the Office Action have been overcome, and that all claims in the application are allowable. No new matter has been added. It is believed that the application is now in condition for allowance, which allowance is respectfully requested.

PLEASE CALL the undersigned attorney at (561) 989-9811 should the Examiner believe a telephone interview would help advance prosecution of the application.

Respectfully submitted,

Date: July 24, 2006

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